

REMARKS

Claims 1-10, 16-21, 25, and 26 were pending prior to the amendments herein. Claims 1-3, 7-10, 16-18, 25, and 26 are amended herein. New Claims 27-34 have been added. Claims 1-10, 16-21, and 25-34 are therefore pending.

Specification Amendments

The Applicants have amended the specification to update the status of an application referred to therein. The Applicants submit that the amendment is fully supported by the application and that no new matter is added by this amendment.

Claim Amendments

The Applicants have amended Claim 1 to recite that a central portion of the seed layer is exposed during removing an edge portion of the seed layer. The Applicants have amended Claim 16 to recite that the entire seed layer is exposed during removing the seed layer. The Applicants submit that the amendments are fully supported by the application and that no new matter is added by these amendments. For example, the discussion of confinement of certain processes to certain portions of the wafer would not be necessary if the seed layer was not exposed because a protective or masking layer would shield the seed layer (e.g., reducing or preventing removal) during those processes. *See, e.g.*, ¶¶ [0028] & [0031]-[0033] and Figs. 2B & 3 of the published application.

The Applicants have also amended Claims 2, 3, 7-10, 17, and 18 to clarify antecedent bases and grammatical issues.

The Applicants have amended Claims 25 and 26 to clarify that the recited features are for removing at least part of the seed layer from the front edge surface after forming the conductive material. The Applicants submit that the amendments are fully supported by the application and that no new matter is added by these amendments. For example, see ¶ [0030] of the published application.

Response to Rejections Under 35 U.S.C. § 103

Claims 1-5, 7-9, 16-19, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,615,854 to Hongo et al. in view of U.S. Patent Publication No. 2004/0038052 to Collins and further in view of U.S. Patent Publication No. 2001/0041447 to Nogami.

Claims 1 and 16

The Applicants respectfully traverse the rejections of Claims 1 and 16 because Hongo, either alone or in combination with Collins and/or Nogami, fails to teach or suggest all of the features of the amended claims. For example, Hongo, alone or in combination with Nogami and/or Collins, at least does not teach or suggest “removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed,” as recited by amended Claim 1, or “removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed,” as recited by amended Claim 16.

The Office Action states that Hongo discloses removal of the seed layer 83 from the back edge and bevel surfaces *after* forming the conductive material 85, but acknowledges that Hongo does not teach or suggest forming the conductive material after removing the seed layer from the back edge surface and the bevel surface. The Office Action attempts to make up for the deficiencies of Hongo by combination with Nogami and/or Collins.

The Applicants respectfully disagree with the characterization of Nogami in the Office Action. Nogami does not teach or suggest “forming a conductive material on the seed/barrier layer 116,114 after removing of the barrier/seed.” Rather, Nogami only teaches the removal of a barrier layer 114, which is taught to be separate and distinct from the seed layer 116, from the edge and back of the substrate 112. Referring to Figure 2A, Nogami does not teach or suggest a process for removal of the seed layer 116 from the edge and back of the substrate 112. Indeed, Nogami does not even recognize that the seed layer 116 may deposit on the edge and back of the substrate 112. *See* Nogami at ¶¶ [0017] & [0018] (“FIG. 2B depicts the system 100 after deposition of the seed layer 116. In accordance with the method and system, the barrier metal layer 114 is etched after deposition of the seed layer 116.”). Nogami then teaches that the seed

layer 116 protects the barrier layer 114 in the center of the substrate 112 during the barrier layer removal process. However, Nogami then states that there is no seed layer at the edge and back portions of the substrate because the barrier metal layer 114 was removed. See Nogami at ¶ [0020]. That is, Nogami teaches that the seed layer 116 is not deposited on the edge and back portions of the substrate 112 because the barrier metal layer 114 is removed from the edge and back portions of the substrate 112 using the seed layer 116 as a mask. Accordingly, Nogami fails to even recognize that the seed layer 116 may be formed at the edge and back portions of the substrate 112, and therefore certainly does not teach or suggest *removal* of the seed layer 116 from the edge and back portions of the substrate 112, either before or after deposition of the conductive layer.

Moreover, Nogami does not teach or suggest “removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed” or “removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed.” To the extent that Nogami teaches removal of any layers at the back edge surface and the bevel surface, it discloses doing so only while there is a mask or protective layer over the areas of the removed layer that are not to be removed. For example, during removing the barrier layer 114, no central portion of barrier layer is exposed because the seed layer 116 acts as a mask. Thus, Hongo, alone or in combination with Nogami, does not teach or suggest all of the features of the amended claims.

Collins discloses removing the second layer 120 from the perimeter portion using a photo-patterning and etching process in which the perimeter portion of the second layer 120 is patterned and etched away. See Collins at ¶ [0024]. Thus, Collins does not teach or suggest “removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed” or “removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed” and Hongo, alone or in combination with Nogami, does not teach or suggest all of the features of the amended claims.

Moreover, Collins exposes the portion 132 in order to form a contact region 130 at the edge of the workpiece 100 so that a plurality of contacts 240 can engage the first layer 110,

thereby providing a uniform current distribution across the workpiece 100. See Collins at ¶ [0026] and Fig. 2C & 3. Accordingly, it is essential that the workpiece 100 of Collins does not have any seed layer 116 in the contact region 130 in order to make proper contact to the first layer 110. As is known in the art, removal of photoresist from a wafer edge may be accomplished in two ways: (1) edge bead removal (EBR), in which an organic solution is dispensed onto the edge of a spinning wafer to remove a bead of photoresist that generally gathers near the bevel; and (2) wafer edge exposure (WEE), in which light at an appropriate wavelength exposes the photoresist at the edge of the wafer, which can then be removed by a developing solution. See *generally* U.S. Patent No. 6,495,312 to Young et al. at Fig. 2 (EBR) and Figs. 4 & 6-11 (WEE). An EBR process can be ineffective for removal of the edge bead of photoresist. See Young at col. 1, ll. 54-66. Accordingly, one of skill in the art would appreciate that Collins utilizes a WEE process in order to properly form the mask used to define the contact area 130. Thus, the teaching of Collins to create a clean interface based on a photoresist process teaches away from a removal process in which a central portion of the seed layer or the entire seed layer is exposed. In Hongo, the seed layer 83 and the conductive layer 85 are removed together after the conductive layer 85 is deposited. Hongo can thus use a chemical process because removal precision is not necessary after the conductive layer 85 has already been formed.

Thus, no combination of Hongo, Nogami, and Collins, or any other references of record, teaches or suggests "removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed," as recited by amended Claim 1 or "removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed," as recited by amended Claim 16. Therefore, Hongo, either alone or in combination with Collins and/or Nogami, fails to teach or suggest all of the features of the amended claims.

Additionally, the combinations of features recited in amended Claims 1 and 16 can provide certain advantages that render the combinations non-obvious over the cited references. For example, removing the seed layer from the back edge surface and the bevel surface before deposition of the conductive layer can reduce the amount of conductive layer deposition on the back edge surface and the bevel surface, which reduces the amount of material that is later

removed from the back edge surface and the bevel surface, thereby increasing cycle time, and reducing material usage. See ¶ [0024] of the published application. For another example, removing the seed layer from the back edge surface and the bevel surface while a central portion of the seed layer or the entire seed layer is exposed can eliminate at least the processes for forming and removing the masking layer, each of which increases cycle time and may cause defects. It will be appreciated that the methods of Claims 1 and 16 do not need to achieve these example advantages and that the methods of Claims 1 and 16 may have additional advantages, but the Applicants have pointed them out only to illustrate some of the unexpected benefits that can be provided by the features recited therein.

Moreover, the Final Office Action does not provide an apparent reason as to *why* one of skill in the art would combine the references in the manner recited by amended Claims 1 and 16. This analysis should be made explicit. See *KSR Int'l Co. v. Teleflex, Inc.*, No. 04-1350 at 14 (U.S. Apr. 30, 2007). Accordingly, despite the amendments, which are made to hasten allowance, the Applicants do not acquiesce to the rejections in the Final Office Action and reserve the right to pursue claims of the original scope in continuing applications.

The Applicants respectfully submit that amended Claims 1 and 16 are patentable as not obvious over the suggested combinations. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of the Claims 1 and 16.

Claims 2-10, 17-19, and 21

As described above, amended Claims 1 and 16 are patentable over Hongo, alone or in combination with Collins and/or Nogami. Claims 2-10 depend from Claim 1. Thus, Claims 2-10 include all of the features of amended Claim 1 and recite unique combinations of additional features not taught or suggested by the cited references. Claims 17-19 and 21 depend from Claim 16. Thus, Claims 17-19 and 21 include all of the features of amended Claim 16 and recite unique combinations of additional features not taught or suggested by the cited references. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of Claims 2-10, 17-19, and 21.

Claims 25 and 26

Claims 25 and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hongo in view of Collins and further in view of Nogami, and further in view of U.S. Patent No. 5,897,379 to Ulrich et al. The Applicants respectfully traverse the present rejection because Hongo, either alone or in combination with Collins, Nogami, and/or Ulrich, fails to teach or suggest all of the features of the rejected claims.

As described above, amended Claims 1 and 16 are patentable over Hongo, alone or in combination with Collins and/or Nogami. Claim 25 depends from Claim 1. Thus, Claim 25 includes all of the features of amended Claim 1 and recites a unique combination of additional features not taught or suggested by the cited references. Claim 26 depends from Claim 16. Thus, Claim 26 includes all of the features of amended Claim 16 and recites a unique combination of additional features not taught or suggested by the cited references. Ulrich does not make up for the deficiencies of Hongo, Collins, and Nogami. For example, Ulrich does not teach or suggest removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed or removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of Claims 25 and 26.

Claims 6, 10, and 20

Claims 6, 10, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hongo in view of Collins and further in view of Nogami, and further in view of U.S. Patent No. 6,352,623 to Volodarsky et al. The Applicants respectfully traverse the present rejection because Hongo, either alone or in combination with Collins, Nogami, and/or Volodarsky, fails to teach or suggest all of the features of the rejected claims.

As described above, amended Claims 1 and 16 are patentable over Hongo, alone or in combination with Collins and/or Nogami. Claims 6 and 10 depend from Claim 1. Thus, Claims 6 and 10 include all of the features of amended Claim 1 and recites unique combinations of additional features not taught or suggested by the cited references. Claim 20 depends from Claim 16. Thus, Claim 20 includes all of the features of amended Claim 16 and recites a unique

combination of additional features not taught or suggested by the cited references. Volodarsky does not make up for the deficiencies of Hongo, Collins, and Nogami. For example, Volodarsky does not teach or suggest removing an edge portion of the seed layer from the back edge surface and the bevel surface without removing the seed layer from a central portion of the front surface and front edge surface while the central portion of the seed layer is exposed or removing the seed layer from the back edge surface and the bevel surface while the entire seed layer is exposed. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of Claims 25 and 26.

Additionally, the Applicants respectfully disagree with the characterization of Volodarsky in the Final Office Action. Volodarsky does not teach a method of removing selected portions of a conductive layer (e.g., the back edge surface and the bevel surface). Furthermore, the Final Office Action has not given a reason as to why or how one of skill in the art should combine Volodarsky with the other references of record in order to meet each and every feature of the rejected claims.

New Claims

Claims 27-34 have been added and are fully supported by the application as originally filed, and no new matter is added by these new claims. For example, see ¶¶ [0032] & [0033] and Figs. 6 & 8 of the published application.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of the present application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child, or related prosecution

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history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

Summary

The Applicants respectfully submit that all of the pending claims are allowable. The Applicants respectfully request that the Examiner withdraw the rejections and pass Claims 1-10, 16-21, and 25-34 to allowance.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 9/28/07

By: Adam Gilbert

Adam Gilbert
Registration No. 59,967
Attorney of Record
Customer No. 20,995
(949) 760-0404

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